The priority set with dial 231 in Figure 4, is a unique priority assigned to each interrupt switch 20 in the system. The priorities are used by decision processes of the system of the present invention's to sequence the return of power to the appliances supported by interrupt switches 20. The interrupt switch's 20 decision processes multiply the assigned priority times various time intervals, to determine the time in the sequence at which power should be returned to the supported appliance. The use of priorities and time intervals are explained in more detail in the descriptions of each interrupt switch process. However, as an introduction to the use of the unique priorities, the intent is to sequence the return of power to appliances supported by interrupt switches. The sequencing of appliance loads avoids overloads that can be caused by the simultaneous return of power to multiple appliances. As loads are added to the generator sequentially, the devices in the system of the present invention have time to monitor changing GAP levels and respond according to their own decision processes.

The GAP level dial 232 allows the user to set which GAP level transmission 17 from the generator monitor 10 the interrupt switch 20 monitors. The user can assign appliances to GAPS1 and GAPC1, GAPS2 and GAPC2 or GAPS3 and GAPC3 by setting Available Power Level dials on the supporting interrupt switches to 1, 2 or 3 respectively.

The reset button 233 is used to clear, or set to zero, the values of appliance surge load and continuous load, Figure 5a step 250, whenever an appliance is first supported by the interrupt switch 20. The interrupt switch 20 measures the surge and continuous loads of the appliance over time in step 251, stores the values of these loads and then uses the load values in the execution of the interrupt switch 20 decision process in Figure 5b. The purpose of the reset button is to zero the stored load values when an interrupt switch is first installed, or when an appliance is changed (i.e. a refrigerator wears out and is replaced with a new refrigerator that has different surge and continuous load characteristics). For interrupt switches that were set with surge and continuous loads manually, or for switches built into the appliance by the manufacturer, the reset button would not be necessary. For interrupt switches designed to be set manually with the

surge and continuous load of the supported appliance, dials for setting these loads would be substituted for the reset button.

Figure 4 depicts an interrupt switch 20 that interfaces in the power line to the appliance by plugging into a standard three-prong outlet via plug 211 and then providing a similar outlet 210 for the appliance. The present invention is equally applicable to configurations with alternative outlet designs and configurations where the interrupt switch is installed in the power line of an appliance that is hardwired to a facility's circuit panel.

Figure 5a and 5b are flow diagrams of the process of interrupt switch 20. In Figure 5a the switch priority and the GAP level are set at installation in step 250 using dials 231 and 232 in Figure 4 respectively. If the surge load and continuous load are to be set manually (not shown) they are set along with the Switch Priority and GAP level. If the Switch is designed to measure and record the appliance load, then these values are set to zero in step 250 by the reset button 233 in Figure 4. The interrupt switch 20 is then plugged into the wall outlet and the appliance is plugged into the interrupt switch. With this installation being done prior to a utility power failure, the interrupt switch 20 has several opportunities to measure and establish the typical or maximum surge and continuous load 251 of the appliance. With these load characteristics measured and stored, the switch is ready for the first power failure.

When the power fails 252 and then returns 253, the interrupt switch 20 opens its switch in step 254 and interrupts the supply of power to disable the appliance. At step 255 the interrupt switch 20 executes a decision process to determine if the power returning to the outlet is from the electric utility or from the generator. The decision process in step 255 is based on the presence or absence of Generator Available Power (GAP) transmissions coming from the generator monitor 10 in Figure 1. If GAP transmissions are not detected in step 255, then utility power has returned and the interrupt switch 20 may close immediately and return power to the appliance. However, there is an opportunity to provide benefit to the utility grid by delaying the return of power after decision process 255 leads to path 256, by executing an additional time delay via the process in step 257.

It is well known that when utility power is returned, the sudden start up load of all the appliances left on during the outage puts a heavy strain on the utility grid, potentially causing damage to the equipment in the grid. In order to lessen this start up load, the interrupt switch 20 executes a delaying time sequence that causes the load of its appliance to be applied several seconds, or potentially a few minutes, after the utility power is returned. This reduces the total start up load when power returns and reduces the chances of damage to the utility grid. In this flow diagram the delay sequence 257 is simply the assigned priority of the interrupt switch 20 multiplied by a wait constant T1. Given there are numerous known timing sequences; there are many processes for executing a gradual return of appliance loads to the utility grid. A unique aspect of the present invention is the use of the appliance disabling capabilities of interrupt switch 20 for this second purpose of delaying the appliance load when utility power returns.

In the case of a utility power failure where the generator provides power to the system, the interrupt switch 20 detects the transmission of the GAP levels in step 255 and executes a decision process along path 258 and the control proceeds according to the process flow diagram of Figure 5b.

With reference to Figure 5b, the "Wait T2 * priority" function 270 provides a delay that allows the generator a time period in which to warm up before the appliance is provided power and allowed to turn itself on if necessary. Depending on the design, both engines, or fuel cells, require anywhere from a few seconds to a few minutes to warm up before full load can be applied without inflicting excessive wear and tear. The value of T2 is set to allow the gradual return of appliance loads to the electrical system currently being supported by the backup power source. Assume a combustion engine powered generator requires 15 seconds to fully establish oil pressure at which point the manufacturer recommends no more than half the total load be applied for minimal wear and tear on the engine. The manufacturer further recommends full power be delayed for a total after 45 seconds after cold start allowing certain engine parts to achieve a higher or near full operating temperature. For this set of engine requirements, T2 is set to 15 seconds causing the first appliance, with its interrupt switch 20 set to priority one, to wait 15